

Land Degradation and Runoff Changes in the Highlands of Ethiopia

Hans Hurni, Centre for Development and Environment (CDE), Switzerland; Berhanu Debele, NCCR North-South, Ethiopia; Gete Zeleke, Global Mountain Program, Ethiopia; Solomon Abate, Nile Basin Initiative, Ethiopia; Amare Bantider, Dilla University, Ethiopia; Birru Yitaferu, Amhara Regional Agricultural Research Institute, Ethiopia; Eva Ludi, Overseas Development Institute, United Kingdom

The Ethiopian Highlands constitute 50% of the country and were once forested to a large extent. Nowadays, merely 20% are covered by trees (3% by closed forest), evidencing a high extent of agricultural activities in the historic past and up to today. The consequences are land degradation, and there is increased direct runoff in the highlands and to the lowlands.

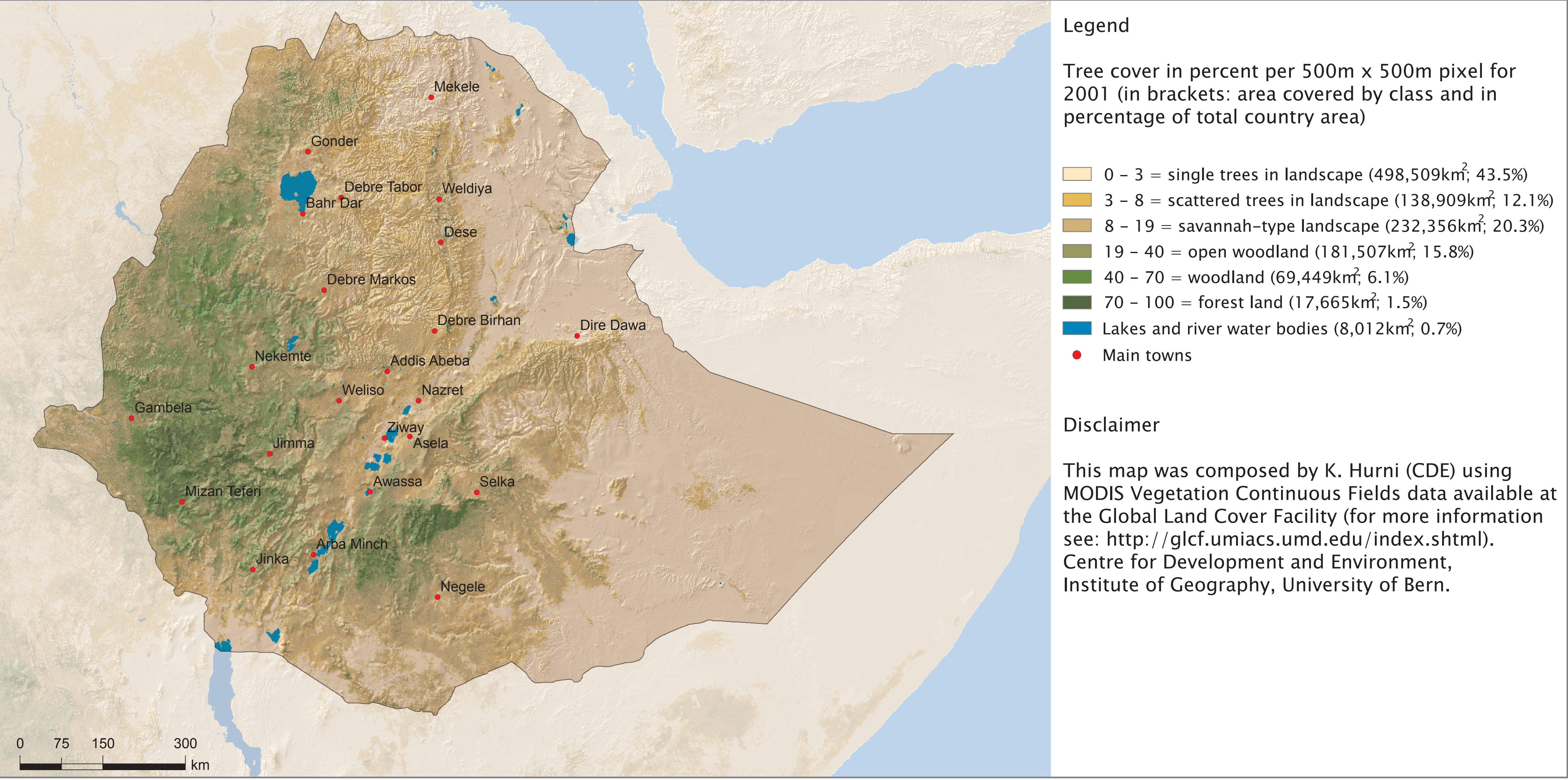


Figure 1: Present day tree and forest cover in Ethiopia as modified by agricultural activities during the last 5000 years (Hurni in prep.)

Deforestation

Deforestation in Ethiopia has been a major land degradation process induced by farmers who wanted to change forest land for use as grassland and cropland. Most areas that currently have more than 3% tree cover are assumed to have been forested about 5000 years ago. Especially in the past millennium, the north-central highlands were a focus of agricultural expansion, where currently a 3-19% tree cover can be observed (cf. Fig. 1). The zone with 19-40% canopy cover has been heavily deforested particularly in the past 50 years (cf. Fig. 3).

Soil degradation and runoff changes

Besides deforestation, soil erosion is a further process of land degradation. Agricultural activities and associated soil erosion have led to severe and widespread soil degradation. This is still threatening agricultural production despite a number of soil and water conservation measures introduced decades ago. Land use change and advanced land degradation have also increased direct surface runoff (cf. Fig. 2), thereby benefitting lowland areas such as those in Sudan and Egypt, to which water is drained. With runoff the sedimentation rates also increased, posing problems for the reservoirs in the lowlands.

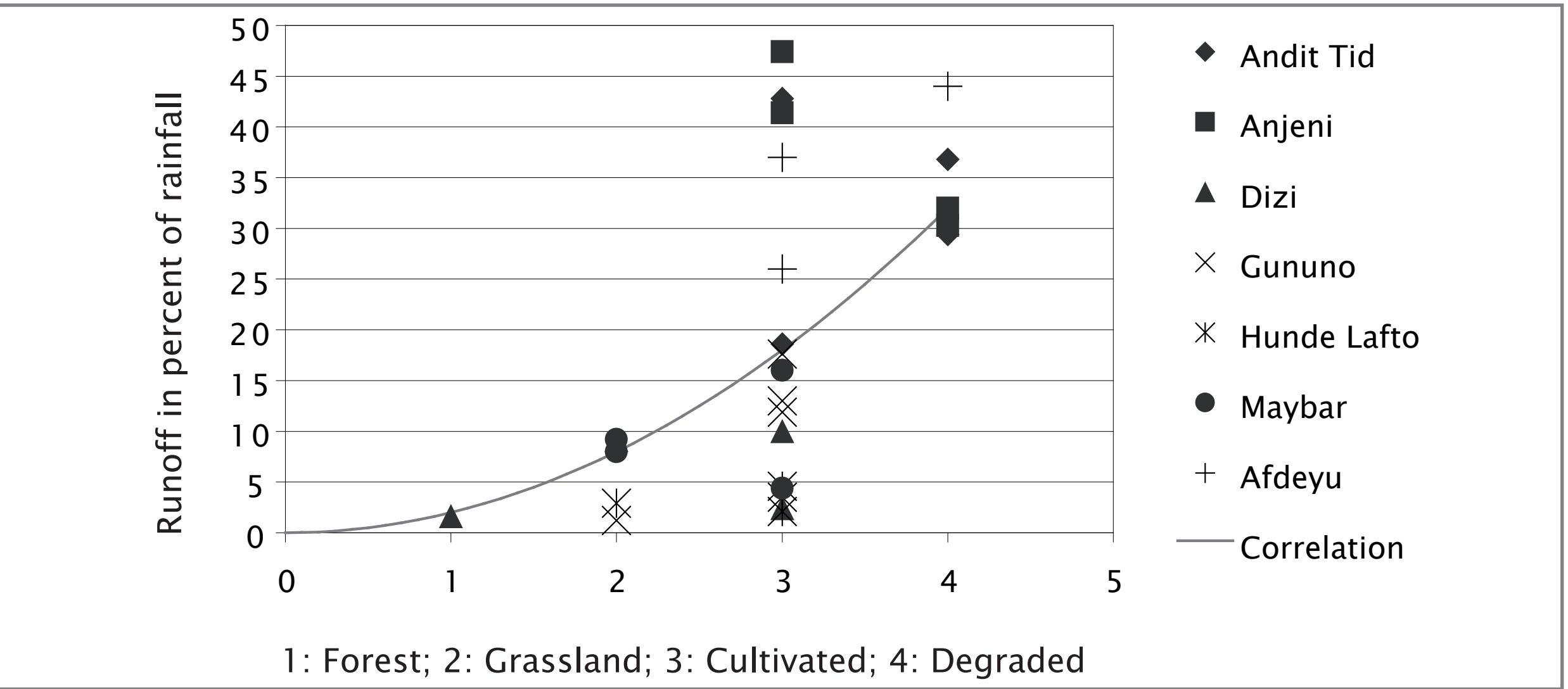


Figure 2: Long-term runoff coefficients measured from testplot experiments (2m by 15m) under natural rainfall and field conditions in seven research sites in the Ethiopian and Eritrean highlands between about 1981 and about 1996 (Hurni et al. 2005)

Conclusion

Land degradation remains a main threat to sustainable agricultural development, and the soils on slopes could be completely washed away within few generations. However, wise management of vegetation cover and soil structural measures have the potential to significantly reduce land degradation and improve agricultural production. Widespread application of these measures has been, and must still be supported by government and the rural society.



Figure 3: Intensive land cover and land use changes in Anjeni Research Site near Debre Markos mainly occurred between 1950 and 1980 according to Gete Zeleke (2000) (Photo by H. Hurni 1984)